

DESIGNING COLLABORATIVE LEARNING ENVIRONMENT ON MOBILE DEVICE

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ABSTRACT

This research aims to: 1) design collaborative learning environment on mobile device and 2) evaluate and certify the suitability of collaborative learning environment on mobile device. The Research is divided into two steps: 1) designing collaborative learning environment on mobile device and 2) evaluating and certifying the suitability of collaborative learning environment on mobile device. The sample consisted of five experts by purposive sampling. The sample must have relevant experience with at least three years in instructional design, education technology, and mobile learning. The form of evaluating and certifying the suitability of collaborative learning environment on mobile device was used as a research tool. The mean and standard deviation were used to analyze and report data.

The results showed that: 1) The design collaborative learning environment on mobile device is composed of eleven components as follows: 1.1) Mobile Device Interface, 1.2) Technology Support, 1.3) Content, 1.4) Visual Design, 1.5) Open Education Resources, 1.6) Social Application, 1.7) Learner, 1.8) Facilitator, 1.9) Activities, 1.10) Evaluation and 1.11) Collaborative Learning. 2) The experts evaluated and certified the collaborative learning environment on mobile device. The overall suitability of components of collaborative learning environment on mobile device was rated as "Most"

KEYWORDS: *Learning Environment, Collaborative Learning, Mobile Device and Mobile Learning*

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INTRODUCTION

Statement of the Problems

Information technology communication devices have been developed their usage more simply and comfortable. They are smaller and lighter such as tablet or smart phones which are handy for the daily usage. The recent information from Office of National Telecommunications Commission revealed that the number of mobile user In Thailand is accounted for 91% of whole population. Additionally, the survey also discovered the rapid growth of smart phone users which has a great proportion of 63.3% (nbtc, 2014). The development of mobile device allowed the quick and easy of the data accessibility, researching, and communication. The survey of in Mobi, service provider of Mobile Advertising Network 2013, displayed that Thai people mostly used mobile phone for searching and looking on information by spending 6.6 hours per day. Therefore, mobile phone is the device that always sticks with users and has more roles in our daily life.

Concerning the application with education, apart from the eliminating the constraint about time and place of learning on mobile device, the communicating through mobile phone especially the smart phone, also supported Animation and Multimedia presentation, and could help collaborative interaction between learners, teachers, and

classmates via SMS, Chat, e-mail, or video call. It is obviously that the advantage of mobile phone covered the supporting of the interaction between learners and teachers and among learners, with resources much easier and quicker to access through mobile device, encouraging the efficiency of collaborative learning. According to Anuradha (1995) cited in Aungsinanda Intarakamkeng (2004) who has reported that collaborative learning teamwork was highly effective. This is due to the collaborative learning provided the exchanging of ideas and experiences among mutual interest. Everybody has a chance to exchange opinions, create new knowledge, or share knowledge between each other. Appropriate learning environment stimulated learner interest and learning motivation. Moreover, it also supported and facilitated in effective learning and teaching. Orjaree Na Takaotung (2003) revealed that learning environment was the creating, providing, improving, and adjusting physical, image, and social environment in order to help the learner with his/her cognitive domain, effective domain, and psychomotor domain.

From the collaborative learning which concentrated on group process allowing the group interaction, exchanging opinions, and sharing learning resources, it could be applied through mobile phone features in learning and teaching management by encouraging the direct interaction, including transferring direct experiences of learners with each other instead of sitting in front of the computer monitor themselves. Therefore, the researcher is interested in designing collaborative learning environment on mobile device to improve learner's knowledge, skill, and attitude.

OBJECTIVES

Design collaborative learning environment on Mobile Device to improve learner's knowledge, skill, and attitude.

- Analyze and synthesize the component influencing the design of collaborative learning environment on Mobile Device
- Design collaborative learning environment on Mobile Device

Evaluate and certify the design of collaborative learning environment on Mobile Device to improve learner's knowledge, skill, and attitude.

RESEARCH QUESTION

What are the components that will affect the design of collaborative learning environment on mobile device to improve learner's knowledge, skill, and attitude?

How does the collaborative learning environment on mobile device improve learner's knowledge, skill, and attitude?

SCOPE OF THE STUDY

Sample and Population

The population is the experts on instruction design and Mobile Device

The sample consists of 5 experts by purposive selection. The sample must have relevant experience with at least three years in instructional design, education technology, and mobile learning.

RESEARCH METHODOLOGY

Phase 1: The Design Collaborative Learning Environment on Mobile Device

Analyze and synthesize information on conceptual, principle, and component of collaborative learning, learning through mobile learning and learning environment as basic information for defining component of collaborative learning environment on mobile device.

- Analyze the component of collaborative learning from related documents and research which displayed that the collaborative learning concentrated on group work with more than two people using analyzing, criticizing, group discussion, and direct interaction to find understanding, meaning, choices, or new knowledge. The components of collaborative learning were as follows: (Yung-Ting Chuang. 2015, Elizabeth F. Barkley and Other. 2014, Joanne Gikas and Michael M. Grant. 2013, Monchai Thienthong. 2016, Kanyarat Srivistheeyakul 2013, Siriwan Piriya suwan 20125, Prapaipis Ketpanich 2011, Thongsak Thongsanid 2000, Angsinanda Intarakamheng 2004)
 - Learner
 - Facilitator
 - Activities
 - Evaluation
 - Positive interdependence
 - Interaction
 - Collaboration
 - Group Processing
 - Social Constructivist
- Analyze component of learning through mobile device from related documents and research which revealed that it was the learning through different mobile devices such as smart phone, tablets, handy computer, etc. by using information technology and the communication on wireless network. Learners can access lesson resources and interact between learners and facilitators or between learners themselves together with sound, image, or animation anytime and everywhere. The components of learning on mobile device were as follows: (Jorge Brantes Ferreira and Other. 2013, Norazah Nordin and Other. 2010, Knowledge Anywhere. 2002, Thongchai Kaewkiriya 2015, Saroj Sopeeruk 2015, Boonlert Arunpaiboon, 2014)
 - Mobile Device Interface
 - Technology Support
 - Content
 - Visual Design
 - Open Education Resource
 - Social Application

- Analyze component of learning environment from related documents and research which found that it was environment surrounded learners influencing learners effective and efficiency covering physical environment, imagination environment, and social environment. (Patchreeruk Thanonsob 2003, Sujin Wisawatheeranonda 2012, Onjaree Na Takuatung 2003)

Present the component of collaborative learning environment on Mobile Device to an advisor for correction and suggestion if there is any.

Design the draft of collaborative learning environment on Mobile Device in illustration form and evaluate by 5 experts using open-ended questions on the design, appropriate component, and important factors to be included in the draft. The important information derived from experts to be added were as follows:

- To compile each components together as follows: the Positive Interdependence, Interaction, Group Processing, Collaborative and Social Constructivist to become one component, Collaborative Learning.
- To increase another components as follows:
 - Learner – to describe group and roles of learners.
 - Facilitator - to describe facilitators' roles including technology of collaborative learning on mobile device.
 - Activities - to describe characteristic, method and procedure of activities on collaborative learning on mobile device.
 - Evaluation - to describe the learning assessment of knowledge, skills and attitude.
 - Dependent variable of collaborative leaning environment on mobile device, focusing on knowledge, skills and attitude.
 - Improving the draft of learning environment design in accordance with the experts' suggestions.

Phase 2: Evaluate and Certify Collaborative Leaning Environment on Mobile Device

- Design the tools for evaluating collaborative leaning environment on mobile device and submit to an advisor for correction and suggestion.
- Present the draft of the collaborative leaning environment design on mobile device which was evaluated by 5 experts for evaluating and certifying by using the evaluation form
- Analyze the evaluation outcome of the collaborative leaning environment design on mobile device by using statistic, mean, and standard deviation with 5-point Likert scale survey.

RESULTS

The results of the study were:

Phase 1: The Design Collaborative Learning Environment on Mobile Device

The data obtained from analyzing and synthesizing component of collaborative learning, learning through mobile learning, and learning environment as basic information for defining component of collaborative learning environment on

mobile device were as follows:

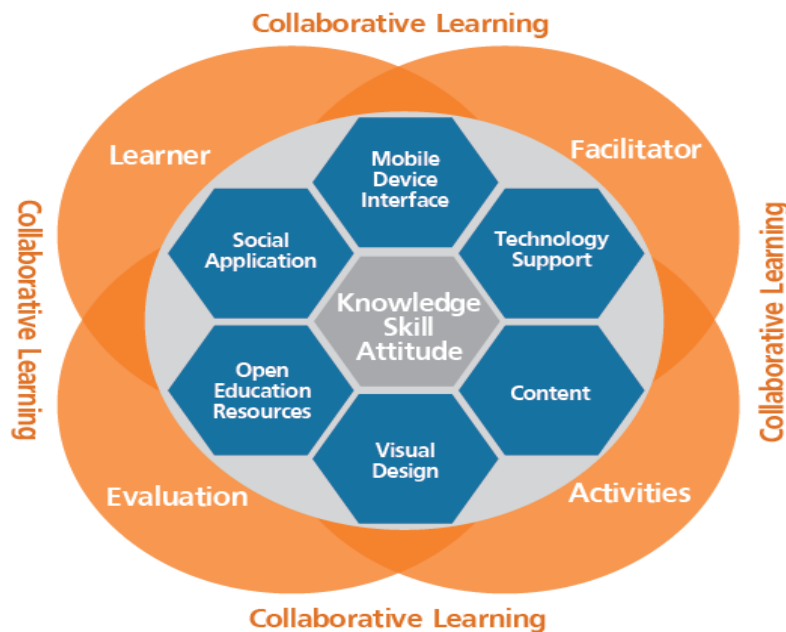


Figure 1: Collaborative Learning Environment on Mobile Device

The three components found in each side from collaborative learning environment on mobile device were on 1) Knowledge; effective learning on intellectual reflected in creative information, thinking stimulus, and different point of views, 2) Skill; knowledge searching skills, mutual governing skills, and collaborative working skills, and 3) Attitude; positive attitude in collaboration and open minded. The 11 components found were:

- Mobile Device Interface for connection and interaction in which learners can input data through a keyboard, a touch screen of mobile device, and a touch screen pen.
- Technology Support was supporting technology for learning through handy tools in sending and receiving data, picture and sound, or multimedia composing of Wireless Telecommunication, EDGE, 3G, 4G, Bluetooth, and including lesson management on mobile device such as MLMS (Mobile Learning Management System) and MCMS (Mobile Content Management System).
- Content was a part of lesson covering exercise, test, and others knowledge information to be transferred to learners.
- Visual Design on Mobile was the design in part of visualizing on screen of mobile device such as Text, Graphic and Page Layout.
- Open Education Resource was educational learning resources that users can access without expenses or license. It was the way to increase learning quality in accessing learning materials and resources. Open Education Resource included open curriculum and content, free curriculum, open academic textbook, open software for learning, and learning materials resources.

- Social Application was a tool for online communication and interaction. It was a simple Two Way Communication which was a collaboration working and create online community including delivering and exchanging information such as SMS, Discussion forums, Video Call, E-mail, and Social media.
- Learner was learners group that working together above 2 people. Those learners have to follow the instruction in Mobile Device, communicate among group members for collaboration and submit homework or answers through Mobile Device.
- Facilitator was teacher who has knowledge on using information technology and communication. Facilitator has role on preparing lesson, studying and analyzing lesson content, planning a clear teaching objective, designing learning activities based on collaborative learning, defining learning evaluation method, providing learning and teaching materials through mobile device
- Activities were learning process which has an important part in developing learning skills. These activities has to be in a continuing learning process with appropriate stage as follows:
 - Presenting necessary basic knowledge in order to prepare learner before entering into learning activities, and learner can search knowledge and information from differently learning resources through Mobile Device
 - Presenting update content so that learner can do activities with new knowledge comprising of different activities for presenting new or update content through mobile device.
 - Stimulating the learning responses by posing interesting problem issue to train learner in thinking, observation, suspecting and questioning logically. Facilitator posed questions and transferred them to learner's Mobile device.
 - Grouping learning activities was the stage on defining collaborative learning in which applying knowledge and information from group discussion and analyzing, synthesizing and concluding with learner interaction through social application in their mobile device
 - Concluding group results and presenting knowledge received which was effective by rearranging those knowledge in order to create new knowledge structure. Learners presented the most appropriate answers through application on Mobile Device
- Evaluation covered pre test, post test, behavioral observation, and attitude questionnaires.
- Collaborative Learning was one of teaching strategy concentrated on small group working in which the members of the group must have different abilities to encourage each learner capability, support collaborative help in accomplishing the objective plan with the following components:
 - Positive interdependence - Group member must respect each person righteous, ability, and trust each other so that they can accomplish their objective while the mistaken occurred would reflected the whole group outcome.
 - Interaction - The distant interaction through mobile device produced the knowledge sharing, checking understanding as well as knowledge adjusting to group. Each person activity help creating knowledge from interaction with others or social.

- Collaboration - The use of appropriate collaborative skills was the collaboration in developing and training to create knowledge, mutual decision and communication among each other.
- Group Processing - The collaborative group processing, including target, duration and group conduction in which learner was grouped in accordance with mutual interest and aptitude. The group successful was counted on a well collaboration, good relationship emphasizing on the reflection of interrelationship, the support of collaboration skills, rewarding on positive behavior and the congratulating to the success.
- Social Constructivist - It is believed that knowledge was the result from social process from social discussion and social conclusion. People could have more knowledge and understanding if there was exchanging or collaborating activities. So the group conversation among learners could invent knowledge which is connected with the existing skills, and experiences of each learners. After the collaborative activities among learners, learners themselves could connect their existing knowledge on lesson content and understand other learner's ideas in order to create new knowledge of their group.

Referring to collaborative learning environment on mobile device, it was the conducting of environment for learner by providing interaction, transferring knowledge, helping, mutual problem solving for developing learning skill, working skill, higher thinking skill, searching skill, definition skill, and technology skill for the learner independent and their life application that developing coverage learner's knowledge, skill, and attitude.

Phase 2: Evaluate and Certify Collaborative Learning Environment on Mobile Device

The evaluation and certifying collaborative learning environment on mobile device from 5 experts concluded as follows:

Table 1: The Evaluation and Certifying Collaborative Learning Environment on Mobile Device

S NO	Component of Learning Environment on Mobile Device	Mean	Standard Deviation	Suitability
1.	Mobile Device Interface	5.00	0	Most
2.	Technology Support	5.00	0	Most
3.	Content	5.00	0	Most
4.	Visual Design	5.00	0	Most
5.	Open Education Resources	5.00	0	Most
6.	Social Enable Application	4.80	0.45	Most
7.	Learner	5.00	0	Most
8.	Facilitator	5.00	0	Most
9.	Activities	5.00	0	Most
10.	Evaluation	5.00	0	Most
11.	Collaborative Learning	4.80	0.45	Most
Total		4.96	0.19	Most

Table 1 displayed the evaluation and certifying collaborative learning environment on mobile device that the experts agreed with the 11 components of collaborative learning environment that they were suitable with mean of 4.96 and at the most suitability in every component.

DISCUSSIONS

According to the design of collaborative leaning environment on Mobile Device, the study has been analyzed and interpreted in consistent to research objectives, principle, conceptual, and hypothesis as well as related research as follows:

The design of collaborative leaning environment on Mobile Device derived from the study on documents, textbook, related research, obtained the principal of collaborative learning, Mobile Device technology through mobile learning. The study found that the components of the design of collaborative leaning environment on Mobile Device produced 3 learning behaviors covering knowledge, skill, attitude and the 11 components found were 1) Mobile Device Interface, 2) Technology Support, 3) Content, 4) Visual Design, 5) Open Education Resources, 6) Social Application, 7) Learner, 8) Facilitator, 9) Activities, 10) Evaluation, and 11) Collaborative Learning. Therefore it can be seen that the component of collaborative leaning environment on Mobile Device included physical, imagination and social environment. in consistent to Onjaree Na Takuatung (2003) and Patcharee Thanonsob (2013) who revealed that the learning environment arrangement was building, providing, improving and adjusting physical, imagination and social environment for learner behavior development with cognitive domain, effective domain, and psychomotor domain. The physical environment was Mobile Device Interface, Technology Support, Content, Open Education Resources, and Social Application. The imagination environment was Learner, Facilitator, Visual Design, Activities, Evaluation, and Collaborative learning. Moreover the collaborative leaning environment on mobile device which according to Norazah Nordin and other (2010) examined the structure of Mobile Learning that generic mobile environment comprised users, the main users and activity users such as students, and secondary users were content service users, teachers. Besides the design of interface has important role for presenting information on mobile device so that it can response to the communication on large and small screen. For the mobile learning context was the use of technology for learning support incorporated with mobile learning. Furthermore, the mobile device was used for supporting activity in collaborating between learner, facilitator and learner, and learner and other resources.

CONCLUSIONS

Suggestion

General Suggestion

- The design of collaborative leaning environment on mobile device indicated that there were 11 leaning environment components in which every component has the most suitability. The result found can be used as basic information for facilitator or related person in considering the management of collaborative leaning environment on mobile device.
- The evaluating and certifying the suitability of collaborative learning environment on mobile device showed that facilitator or related person can apply learning environment components for further development as a part collaborative leaning environment on mobile device and encouraging 3 sides of leaning behavior covering knowledge, skill and attitude.

Suggestion for Further Research

- To study learners' identity variable that effect on collaborative learning environment on mobile device such as learners' level to the suitable components for learners utilize.

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